The impact of tobacco tax reforms on poverty in Mexico

Appendix[☆]

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Appendix A.

This appendix explains the link between the economic cost and the price elasticities for the bundle of goods used in the calculations. First, we explain briefly how we obtain the conditional tobacco price elasticity by using a Two-part model. We use a log-log specification available in the WELCOM Stata package. Let the quantity demand function be:

$$lq_i = \epsilon\, lp_i + n\, ly_i + \alpha X_i + \beta M_i + \gamma MR_i + \varepsilon_i, \tag{A.1}$$

where lq_i refers to the log of the household's i purchased quantity of cigarettes using sticks, ly_i the log of the disposable income of the household, ϵ the elasticity coefficient from the $\log$ of tobacco price faced by the household. X_i and M_i are two sets of independent continuous and categorical variables, respectively, specification in line with other study for Mexico (**?**). We also add a cheap/expensive indicator calculated from excise taxes purged from endogeneity on price and quantity. Finally, ε_i is an *iid* normally distributed error term. The Inverse Mills Ratio (MR) was obtained from a PROBIT model on the same identical specification as (**?**) and only 2016 data survey was used. Estimation results are available upon request.

Let the price of good k, $p_k = 1 + t_k$ and the price-elasticity of good k with respect to the price of tobacco, p_j, be:

$$e_{k,j} = \frac{\partial X_k(p)}{\partial p_j}\frac{p_j}{X_k(p)} \tag{A.2}$$

We define the marginal revenue as

$$MR_j = \frac{\partial R(p)}{\partial p_j} = \left[X_j(p) + \sum_{k=1}^{K} t_k \frac{\partial X_k(p)}{\partial p_j} \right] \tag{A.3}$$

$$\tag{A.4}$$

Hence, we have:

$$MR_j = X_j \left[1 + \sum_{k=1}^{K} e_{k,j}\frac{t_k}{1+t_j} \right] \tag{A.5}$$

$$MR_l = X_l \left[1 + \sum_{k=1}^{K} e_{k,l}\frac{t_k}{1+t_l} \right] \tag{A.6}$$

Thus:

$$\gamma = \frac{\left[1 + \sum_{k=1}^{K} e_{k,l}\frac{t_k}{1+t_l} \right]}{\left[1 + \sum_{k=1}^{K} e_{k,j}\frac{t_k}{1+t_j} \right]}, \tag{A.7}$$

by which we note that γ is a simple ratio of sums of weighted price elasticities. If we assume zero cross-price elasticities, then (A4) reduces to

$$\gamma = \frac{\left[1 + e_{k,l}\frac{t_k}{1+t_l} \right]}{\left[1 + e_{k,j}\frac{t_k}{1+t_j} \right]} \tag{A.8}$$

Appendix B.

Table B.1: Households Poverty, México 2016

Household type	Poverty Condition		Total
	Poor	Not Poor	
Tobacco consumers	593,586	1,267,186	1,860,772
	31.92%	68.08%	100%
Non tobacco consumers	13,117,942	18,439,585	31,557,527
	41.56%	58.44%	100%
Total	13,711,528	19,706,771	33,418,299
	41.03%	58.97%	100%

Source: Author's calculations using ENIGH survey, 2016 and FGT indices.